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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/756,977	01/13/2004	Alan D. Kersey	CC-0700	3781

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EXAMINER	
LAU, TUNG S	
ART UNIT	**PAPER NUMBER**
2863	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/01/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)
	10/756,977	KERSEY ET AL.
	Examiner	Art Unit
	Tung S. Lau	2863

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 05 February 2007.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1,11-21,27-36 and 38-46 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1,11-21,27-36 and 38-46 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date 02/05/2007.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 02/05/2007 has been entered.

Joint inventor

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 C.F.R. 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Information Disclosure Statement

3. Information Disclosure Statement filed on 02/05/2007 is acknowledged by the examiner; A copy of a signed PTO-1449 attached with this office action.

Claim Objection

4. Claim 27 is objected as this is depends on a cancel (claim 37) claim. From the contains of the claim, the examiner assumes it is depend on claim 11 for this action, correction is required.

Claim Rejections - 35 USC § 101

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 101 that form the basis for the rejections under this section made in this Office action:

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

In claim 1, the method for measuring the flow velocity of a fluid including providing sensor reading, processing signals and determining slope from the data, determining fluid velocity. These claims appear to merely describe data transformation and lack of concrete and tangible result. The practical application of the claimed invention cannot be realized until the information determined is conveyed to the user. For the result to be tangible it would need to output to a user or stored for later use. Hence the claims are treated as nonstatutory functional descriptive material (See MPEP § 2106 and <u>OG Notices: 22</u>

November 2005, Guidelines for Subject Matter Eligibility,

http://www.uspto.gov/web/offices/com/sol/og/2005/week47/patgupa.htm

See MPEP 2106 IV B (1) (b).

For instance in claim 1, the method steps of determining flow velocity are data manipulation. This fails to present a concrete, tangible useful result. An example of a concrete, tangible useful result may include displaying, storing for further use, generating a control signal etc. of the determining. The applicant should review the disclosure to determine what type of tangible result is being carried out in this instant application and such limitation be included in the claim. For further guidance see

http://www.uspto.gov/web/offices/com/sol/og/2005/week47/patgupa.htm

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

a. Claims 1, 11-15, 17, 19, 20, 28, 29, 30, 31, 32, 33, 34, 35, 36, 42, 21, 41, 43, 44, 45, 46, 18, 38, 27, 39 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fernald et al. (U.S. Patent Application Publication 2004/0168523) in view of D.O. Thompson and D.E. Chimenti (non-intrusive, ultrasonic measurement of fluid composition, 1998).

Regarding claim 1:

Fernald discloses a method for measuring the flow velocity of a fluid flowing through a conduit, the method comprising: providing an array of at least two ultrasonic sensors disposed at locations spaced along the length of the conduit in the direction of the flow (fig. 10, unit 82, 83, fig. 12, unit 115, 116, 117, 118) each ultrasonic sensor providing a respective sensors signal indicative of a parameter of an ultrasonic signal propagation through the fluid (page 2, section 0012-0014, fig. 12, unit 12, 150); processing the sensor signals to define a convective ridge in the k-w plane (page 10, section 0124); and determining the slope of at least a portion of the convective ridge to determine the flow velocity of the fluid (page 10, section 0124, fig. 16).

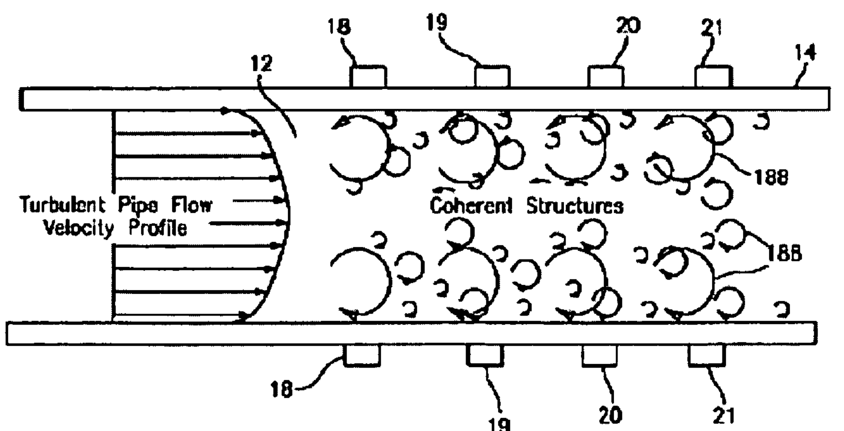

FIG. 2

Regarding claim 11:

Fernald discloses an apparatus for measuring the flow velocity of a fluid flowing through a conduit, the apparatus comprising: an array of at least two ultrasonic sensors unit disposed at locations spaced along the lrngth of the

conduit in the direction of the flow of the fluid (fig. 2, unit 18, -21, fig. 10, fig. 12, section 115, 116); each ultrasonic sensor providing a respective sensor signal indicative of a parameter of an ultrasonic signal propagating through the fluid; a processor that defines a convective ridge in the k-w plane in response to the sensor signals (page 10, section 0124), and determines the slope of at least a portion of the convective ridge to determine the flow velocity of the fluid (page 10, section 0124, fig. 16).

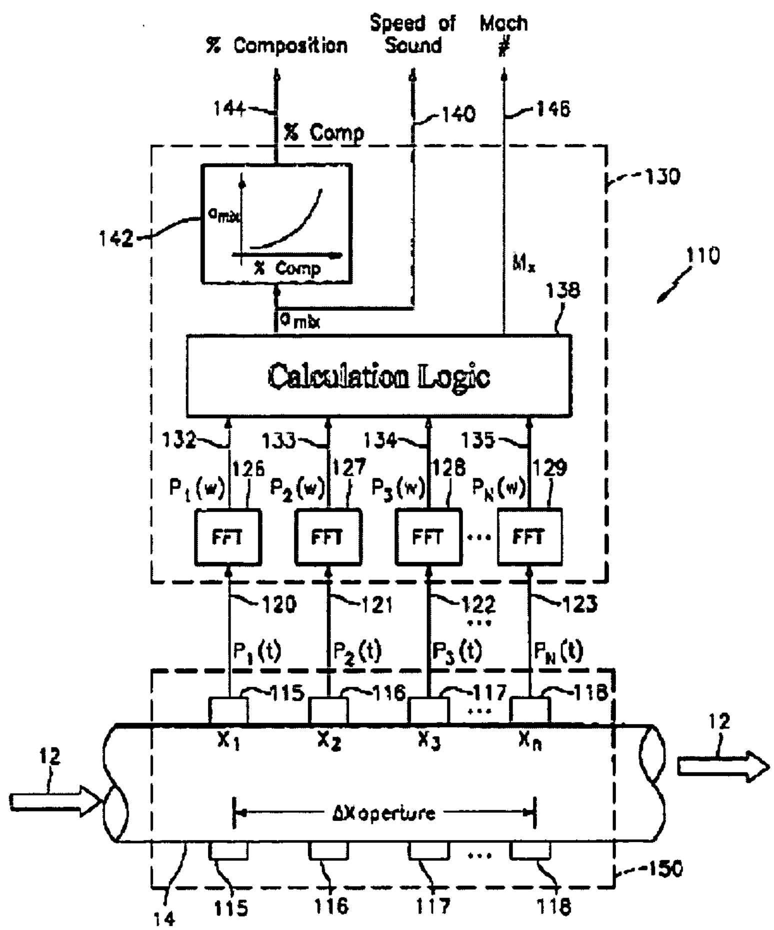

FIG. 12

Regarding claim 21:

Fernald discloses an apparatus for measuring the flow velocity of a fluid flowing

through a conduit, the apparatus comprising: an array of at least two ultrasonic sensors disposed at locations spaced along the length of the conduit in the direction of the flow of the fluid (fig. 2, unit 19-21, fig. 10, unit 83, 84, fig. 12, section 115, 116), each ultrasonic sensor providing a respective sensor signal indicative of a parameter of an ultrasonic signal propagating through the fluid (page 2, section 0012-0014); means for processing the sensor signals to define a convective ridge in the k-w plane, and means for determining the slope of at least a portion of the convective ridge to determine the flow velocity of the fluid (page 10, section 0124, fig. 16).

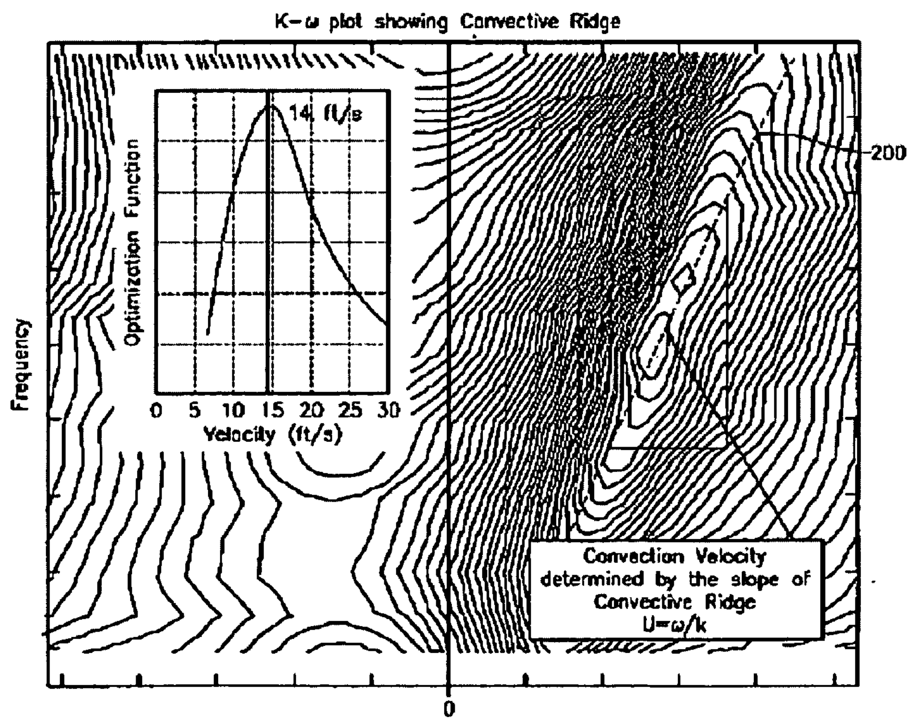

FIG. 16

Regarding claim 41:

Fernald discloses an apparatus for measuring the flow velocity of a fluid flowing through a conduit, the apparatus comprising: an array of at least three ultrasonic sensors disposed longitudinally at respective locations spaced along the length of the conduit in the direction of the flow of the fluid (fig. 2, unit 18-21, fig. 10, unit 83-84, fig. 12, section 115-118), each ultrasonic sensor providing a respective sensor signal indicative of a parameter of an ultrasonic signal propagating through the fluid; and a processor (fig. 12, unit 138, page 2, section 0012-0014), in response to the sensor signals, that determines the flow velocity of the fluid (page 2, section 0012-0014).

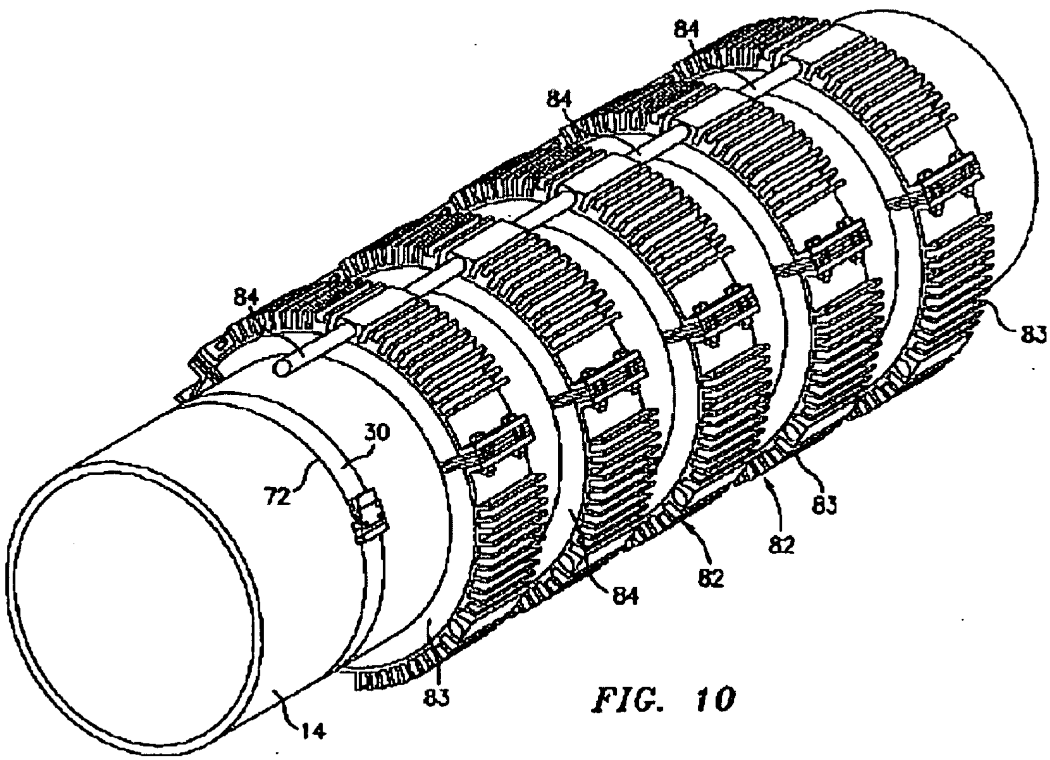

FIG. 10

Regarding claim 43:

Fernald discloses an apparatus for measuring the flow velocity of a fluid flowing through a conduit, the apparatus comprising: an array of at least two ultrasonic sensors disposed longitudinally at respective locations spaced along the length of the conduit in the direction of the flow of the fluid (fig. 2, unit 18-21fig. 12, fig. 10, unit 83-84, section 115-118), each ultrasonic sensor providing a respective sensor signal indicative of a parameter of an ultrasonic signal propagating through the fluid substantially orthogonal to the direction of the fluid flow (fig. 12, section 115, 116); and a processor (fig. 12, unit 138), in response to the sensor signals, that determines the flow velocity of the fluid (page 10, section 0124, fig. 16).

Regarding claim 44, wherein a processor uses an array processing algorithm to determine the flow velocity of the fluid (page 10, section 0124, fig. 16).

Regarding claim 12, Fernald further discloses the processor samples the sensor signals over a predetermined time period, accumulates the sampled sensor signals over a predetermined sampling period, and processes the sampled sensor signals to define the convective ridge in the k-w plane (page 5, section 0064, page 10, section 0124); **Regarding claim 13**, Fernald further discloses the processor further determines the orientation of the convective ridge in the k-w plane (fig. 16, page 10, section 0124); **Regarding claim 14**, Fernald further discloses the sensor signals are indicative of vortical disturbances with the fluid (fig. 2); **Regarding claim 15**, Fernald further discloses the processor

uses a beam forming algorithm to define the convective ridge in the k-w plane (fig. 16); **Regarding claim 17**, Fernald further discloses the processor determines the slope of at least a portion of the convective ridge by approximating the convective ridge as a straight line (fig. 16); **Regarding claim 19**, Fernald further discloses determines the volumetric of the flow (page 4, section 0059); **Regarding claim 20**, Fernald further discloses sensor signal is transmit time to prolong through the fluid (page 9, section 0117); **Regarding claim 28**, Fernald further discloses pulse-echo configuration (fig. 15, unit 180, 182); **Regarding claim 29**, Fernald further discloses at least 3 sensors (fig. 15, unit 180, 182, 184); **Regarding claim 30**, Fernald further discloses amplitude of the signal (fig. 16); **Regarding claim 31**, Fernald further discloses sensors are clamped onto an outer surface of the conduit (abstract); **Regarding claim 32**, Fernald further discloses sensors are attached to the conduit (abstract); **Regarding claim 33**, Fernald further discloses sensor are contact with fluid (abstract); **Regarding claim 34**, Fernald further discloses fluid is single phase (abstract ,fig. 2); **Regarding claim 35**, Fernald further discloses fluid is multiphase (abstract ,fig. 2); **Regarding claim 36**, Fernald further discloses multiphase included liquid and gas (abstract); **Regarding claim 42**, Fernald further discloses the processor uses an array processing algorithm (fig. 12, unit 138); **Regarding claims 45 and 46**, Fernald further discloses at least two ultrasonic sensors (fig. 15, unit 180-186);

Regarding claim 18, Fernald further discloses each ultrasonic sensor includes an an ultrasonic receiver ' which are disposed such that the ultrasonic signal propagating there between is orthogonal to the direction of the fluid flow (page 3, section 0042, fig. 12, unit 115-118, abstract); **Regarding claim 38**, Fernald further discloses the ultrasonic receiver of each ultrasonic sensor are disposed opposing each other such that the ultrasonic signal propagates through the fluid substantially orthogonal to the direction of the fluid flow (fig. 12, unit 115, 116, 117, 118); **Regarding claim 27**, Fernald further discloses sensors are disposed in pitch-catch configuration and receiver are mounted opposing each other (fig. 12, unit 115, 116); **Regarding claim 39**, Fernald further discloses each ultrasonic sensor includes an ultrasonic unit having an ultrasonic receiver (page 3, unit 0034, fig. 12, 115); **Regarding claim 40**, Fernald further discloses ultrasonic signal that propagates through the fluid substantially orthogonal to the direction of the fluid flow, which reflects back substantially orthogonal to the direction of the fluid flow to the receiver of each ultrasonic unit (fig. 2, unit 18, fig. 12, unit 115, fig. 2, unit 12);

Fernald doe not discloses the ultrasonic sensor transmitter, D.O. Thompson and D.E. Chimenti disclose the ultrasonic transmitter sensor (page 2, lines 5), in order to have a very accurate measurement (page 7, lines 4-5).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Fernald to have the ultrasonic sensor transmitter

taught by D.O. Thompson and D.E. Chimenti, in order to have a very accurate measurement

The factual inquiries set forth in Graham v. John Deere Co., 383 U.S. I , 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Fernald, D.O. Thompson and D.E. Chimenti are analogous art because they are from the same field of endeavor, detecting mass flow rate in a conduit.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

a. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fernald et al. (U.S. Patent Application Publication 2004/0168523) in view of D.O.

Thompson and D.E. Chimenti (non-intrusive, ultrasonic measurement of fluid composition, 1998) further in view of Gysling (U.S. Patent 6,609,069)

Fernald, D.O. Thompson and D.E. Chimenti disclose a method and apparatus including the subject matter discussed above except using Capon Algorithm; Gysling discloses using Capon Algorithm in order to have accurate estimate results (Col. 6, Lines 38-46).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Fernald, D.O. Thompson and D.E. Chimenti to have the Capon Algorithm taught by Gysling in order to have accurate estimate results (Col. 6, Lines 38-46)

The factual inquiries set forth in Graham v. John Deere Co., 383 U.S. I , 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Fernald, D.O. Thompson, D.E. Chimenti and Gysling are analogous art because they are from the same field of endeavor, detecting mass flow rate in a conduit.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 11-15, 17-21, 27-36, 38-46 are rejected under 35 U.S.C. 102(b) as being anticipated by Harshal B. Nemade (IEEE transactions on instrumentation and measurement, vol. 47, no. 1, February 1998).

Regarding claim 1:

Harshal B. Nemade discloses a method for measuring the flow velocity of a fluid flowing through a conduit (fig. 1) , the method comprising: providing an array of at least two ultrasonic sensors disposed at locations spaced along the length of the conduit in the direction of the flow (fig. 1) each ultrasonic sensor having an ultrasonic transmitter (page 266, lines 2) and an ultrasonic receiver (page 266, lines 2) and providing a respective sensors signal indicative of a parameter of an ultrasonic signal propagation through the fluid (fig. 3); processing the sensor signals to define a convective ridge in the k-w plane (page 265, equation 2, fig. 1(b)); and determining the slope of at least a portion of the convective ridge to determine the flow velocity of the fluid (page 265, equation 2).

Regarding claim 11:

Harshal B. Nemade discloses an apparatus for measuring the flow velocity of a fluid flowing through a conduit (page 265, equation 2), the apparatus comprising: an array of at least two ultrasonic sensors unit disposed at locations spaced along the lrngth of the conduit (fig. 1(a) in the direction of the flow of the fluid (fig. 1 (a)); each ultrasonic sensor having an ultrasonic transmitter (page 266, lines 2) and an ultrasonic receiver (page 266, lines 2) providing a respective sensor signal indicative of a parameter of an ultrasonic signal propagating through the fluid; a processor that defines a convective ridge in the k-w plane in response to the sensor signals (fig. 1(b)), and determines the slope of at least a portion of the convective ridge to determine the flow velocity of the fluid (page 265, equation 2).

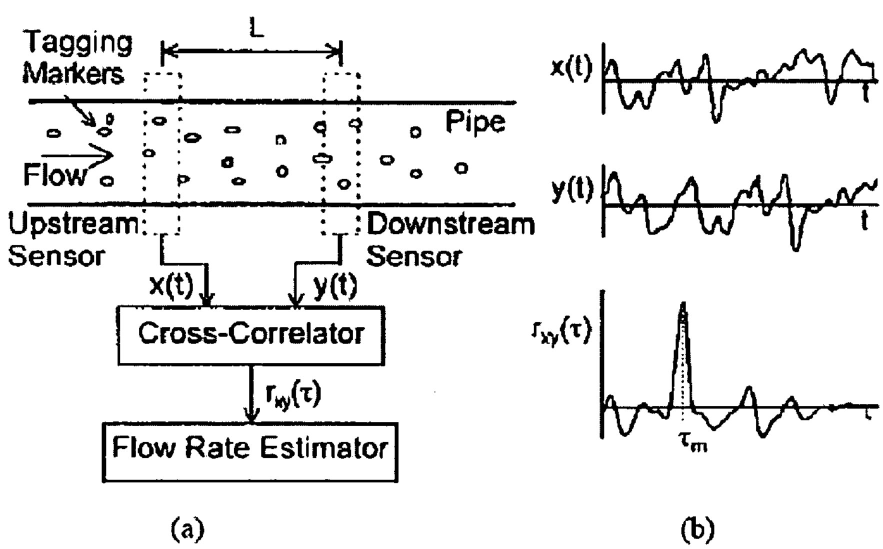

Fig. 1. Schematic of flow measurement by cross correlation technique. (a) Block diagram of cross correlation flowmeter; (b) signals $x(t)$ and $y(t)$ obtained at the two sensing locations, and their cross correlation function $f_{xy}(\tau)$.

Regarding claim 21:

Harshal B. Nemade discloses an apparatus for measuring the flow velocity of a fluid flowing through a conduit (fig. 1(a)), the apparatus comprising: an array of at least two ultrasonic sensors disposed at locations spaced along the length of the conduit in the direction of the flow of the fluid (page 266, lines 1-7), each ultrasonic sensor having an ultrasonic transmitter (page 266, lines 2) and an ultrasonic receiver (page 266, lines 2) providing a respective sensor signal indicative of a parameter of an ultrasonic signal propagating through the fluid (fig. 1(a)(b)); means for processing the sensor signals to define a convective ridge in the k-w plane, and means for determining the slope of at least a portion of the convective ridge to determine the flow velocity of the fluid (page 265, equation 2).

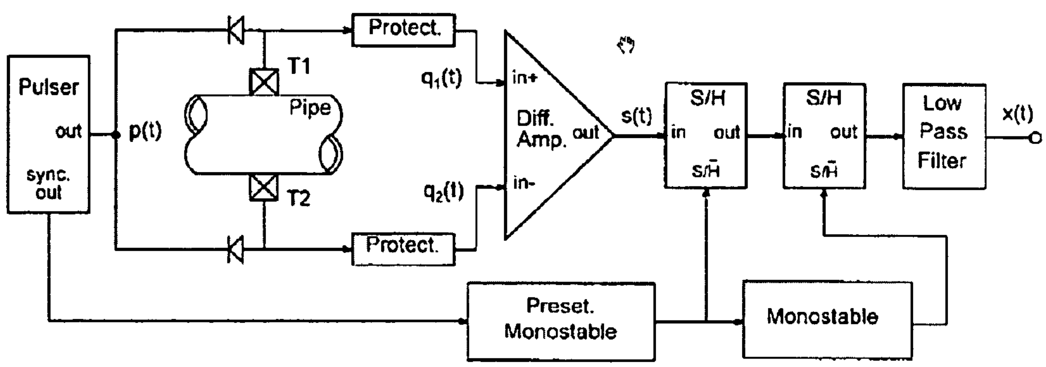

Fig. 2. Block diagram of the system used to sense turbulence in a pipe.

Regarding claim 41:

Harshal B. Nemade discloses an apparatus for measuring the flow velocity of a fluid flowing through a conduit, the apparatus comprising: an array of at least three ultrasonic sensors disposed longitudinally at respective locations spaced along the length of the conduit in the direction of the flow of the fluid (fig. 1 (a)),

each ultrasonic sensor having an ultrasonic transmitter (page 266, lines 2) and an ultrasonic receiver (page 266, lines 2) providing a respective sensor signal indicative of a parameter of an ultrasonic signal propagating through the fluid (fig. 1(b)); and a processor (fig. 4, DATA6000), in response to the sensor signals, that determines the flow velocity of the fluid (fig. 7).

Regarding claim 43:

Harshal B. Nemade discloses an apparatus for measuring the flow velocity of a fluid flowing through a conduit (fig. 1), the apparatus comprising: an array of at least two ultrasonic sensors disposed longitudinally at respective locations spaced along the length of the conduit in the direction of the flow of the fluid (fig. 1, page 266, lines 1-5), each ultrasonic sensor having an ultrasonic transmitter (page 266, lines 2) and an ultrasonic receiver (page 266, lines 2) providing a respective sensor signal indicative of a parameter of an ultrasonic signal propagating through the fluid substantially orthogonal to the direction of the fluid flow (fig. 1); and a processor (fig. 4, unit DATA6000), in response to the sensor

signals, that determines the flow velocity of the fluid (fig. 3).

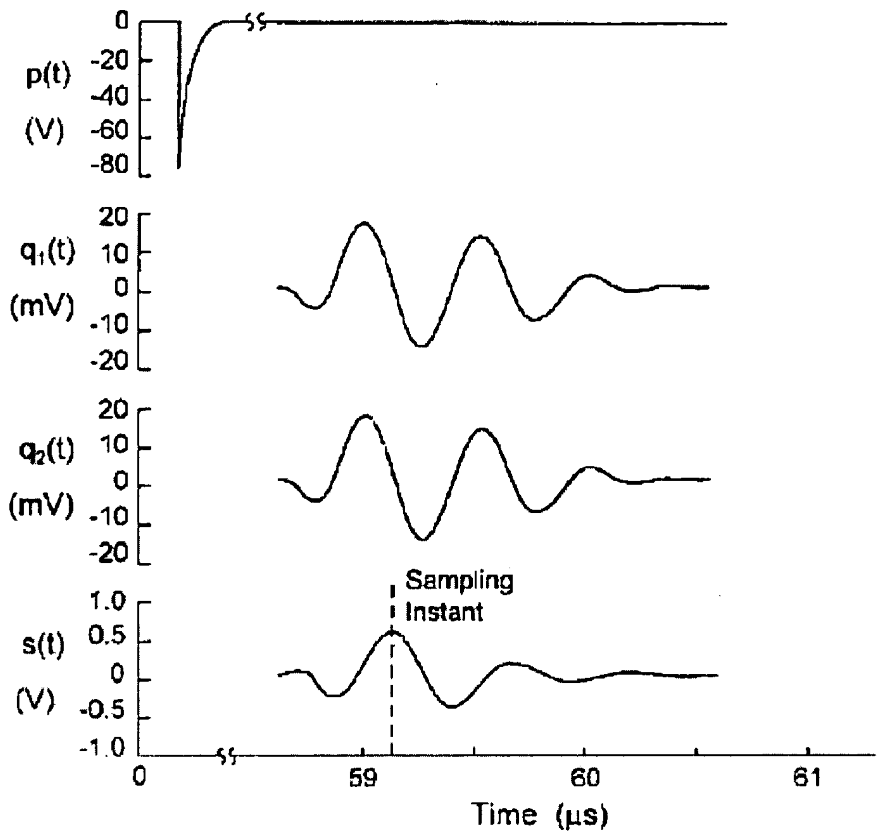

Fig. 3. Waveforms showing excitation pulse $p(t)$, received pulses $q_1(t)$ and $q_2(t)$, and differential amplifier output $s(t)$.

Regarding claim 44, Harshal B. Nemade further discloses wherein a processor uses an array processing algorithm to determine the flow velocity of the fluid (fig. 2, 4). **Regarding claim 12**, Harshal B. Nemade further discloses the processor samples the sensor signals over a predetermined time period (fig. 6), accumulates the sampled sensor signals over a predetermined sampling period (fig. 6), and processes the sampled sensor signals to define the convective ridge in the k-w plane (fig. 6, 7); **Regarding claim 13**, Harshal B. Nemade further discloses the processor further determines the orientation of the convective ridge

in the k-w plane (fig. 7); **Regarding claim 14**, Harshal B. Nemade further discloses the sensor signals are indicative of vortical disturbances with the fluid (fig. 6);

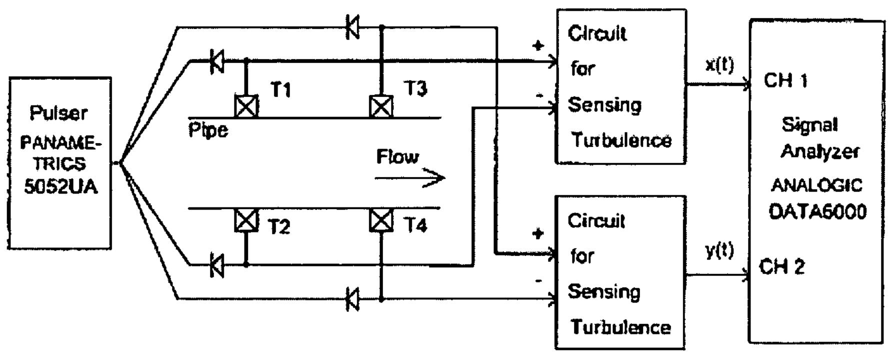

Fig. 4. Block diagram of the experimental setup for flow measurement by cross correlation technique.

Regarding claim 15, Harshal B. Nemade further discloses the processor uses a beam forming algorithm to define the convective ridge in the k-w plane (fig. 7); **Regarding claim 17**, Harshal B. Nemade further discloses the processor determines the slope of at least a portion of the convective ridge by approximating the convective ridge as a straight line (equation 4, 5); **Regarding claim 19**, Harshal B. Nemade further discloses determines the volumetric of the flow (page 268, section V); **Regarding claim 20**, Harshal B. Nemade further discloses sensor signal is transmit time to prolong through the fluid (fig. 1(a)); **Regarding claim 28**, Harshal B. Nemade further discloses pulse-echo configuration (fig. (a)(b)); **Regarding claim 29**, Harshal B. Nemade further discloses at least 3 sensors (page 266, lines 2-3); **Regarding claim 30**, Harshal B. Nemade further discloses amplitude of the signal (fig. 1(b)); **Regarding claim 31**, Harshal B. Nemade further discloses sensors are clamped onto an outer

surface of the conduit (abstract); **Regarding claim 32**, Harshal B. Nemade further discloses sensors are attached to the conduit (abstract, fig. 1(a));

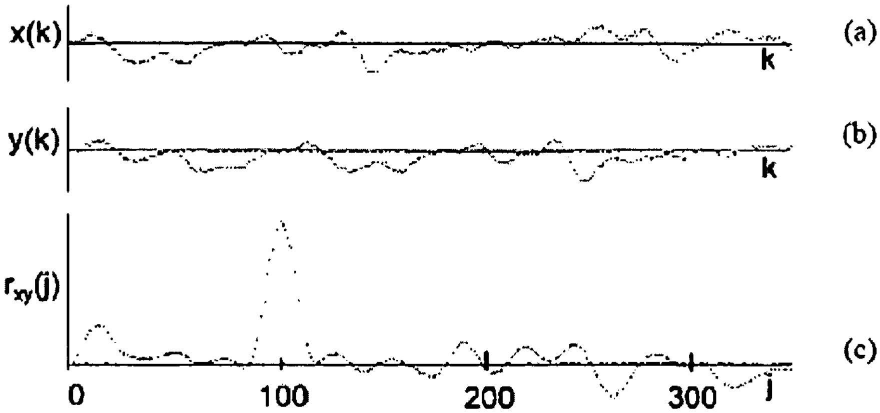

Fig. 7. Results of cross correlator simulation. (a) $x(k)$; (b) $y(k)$; (c) cross correlator output $r_{xy}(j)$, for a delay of 100 samples between $x(k)$ and $y(k)$.

Regarding claim 33, Harshal B. Nemade further discloses sensor are contact with fluid (abstract, fig. 1(a)); **Regarding claim 34**, Harshal B. Nemade further discloses fluid is single phase (abstract ,fig. 1(b)); **Regarding claim 35**, Harshal B. Nemade further discloses fluid is multiphase (abstract ,fig. 1(b)); **Regarding claim 36**, Harshal B. Nemade further discloses multiphase included liquid and gas (page 265, section II, lines 13-14, including any flow as flow vector);

Regarding claim 42, Harshal B. Nemade further discloses the processor uses an array processing algorithm (fig. 2, different processing S/H circuit were use);

Regarding claims 45 and 46, Harshal B. Nemade further discloses at least two ultrasonic sensors (fig. 1(a));

Regarding claim 18, Harshal B. Nemade further discloses each ultrasonic sensor includes an an ultrasonic receiver ' which are disposed such that the

ultrasonic signal propagating there between is orthogonal to the direction of the fluid flow (page 1(a), abstract);

Regarding claim 38, Harshal B. Nemade further discloses the ultrasonic receiver of each ultrasonic sensor are disposed opposing each other such that the ultrasonic signal propagates through the fluid substantially orthogonal to the direction of the fluid flow (fig. 1(a), abstract); **Regarding claim 27**, Harshal B. Nemade further discloses sensors are disposed in pitch-catch configuration and receiver are mounted opposing each other (fig. (a)); **Regarding claim 39**, Harshal B. Nemade further discloses each ultrasonic sensor includes an ultrasonic unit having an ultrasonic receiver (page 1(a), abstract); **Regarding claim 40**, Harshal B. Nemade further discloses ultrasonic signal that propagates through the fluid substantially orthogonal to the direction of the fluid flow, which reflects back substantially orthogonal to the direction of the fluid flow to the receiver of each ultrasonic unit (fig 1(a), abstract).

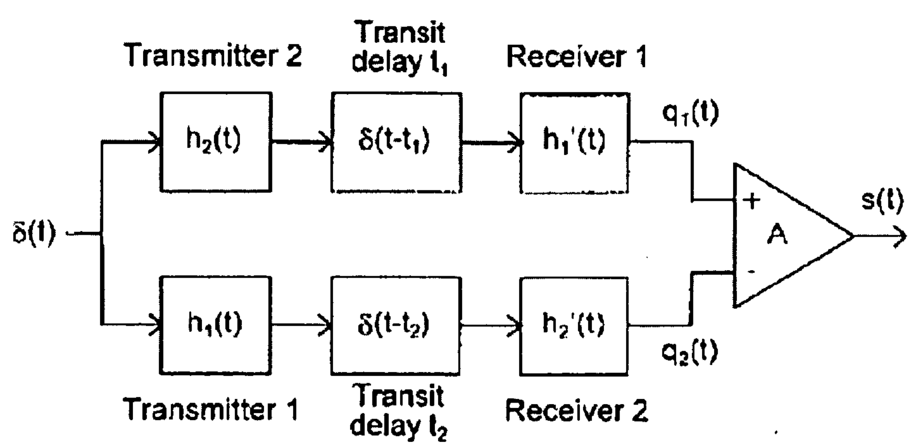

Fig. 5. Block diagram of the model of ultrasonic pulse transmission and reception.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

a. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Harshal B. Nemade (IEEE transactions on instrumentation and measurement, vol. 47, no. 1, February 1998) in view of Gysling (U.S. Patent 6,609,069)

Harshal B. Nemade discloses a method and apparatus including the subject matter discussed above except using Capon Algorithm; Gysling discloses using Capon Algorithm in order to have accurate estimate results (Col. 6, Lines 38-46). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Harshal B. Nemade to have the Capon Algorithm taught by Gysling in order to have accurate estimate results (Col. 6, Lines 38-46)

The factual inquiries set forth in Graham v. John Deere Co., 383 U.S. I , 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Harshal B. Nemade and Gysling are analogous art because they are from the same field of endeavor, detecting mass flow rate in a conduit.

Response to Arguments

10. Applicant's arguments with respect to the amended claims have been considered but are moot in view of the new ground(s) of rejection. However, applicant's arguments filed 02/05/2007 have been fully considered but they are not persuasive.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tung S Lau whose telephone number is 571-272-2274. The examiner can normally be reached on M-F 9-5:30. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Barlow can be reached on 571-272-2269. The fax phone numbers for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tung S. Lau
AU 2863, Patent examiner
February 22, 2007